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teach the truth that fungicides, as at present employed, are far stronger than they may need to be. If a bit of metallic copper in pure water will hold its own weight, or many times that, of spores inactive, it seems likely that the time has come to try a weaker solution of copper.

Since the above was written opportunity has offered to test the spores of a species of *Fusarium* and those of *Cercospora Apii*, the celery blight, both of which germinate with remarkable rapidity in water. When surrounded with their congenial food, that is, an extract of the host-plant, the rate over that of pure water is augmented many times. When copper is added to the water the spores fail to germinate, or in short, the results are the same as those reported for *Monilia*.

Similar experiments have been made with metallic zinc, but even when the spores were literally surrounded by the granulated metal they grew with vigor. A powdered form of metallic zinc was also used, and even in abundance had no retarding effect.

Some Notes on Tripterocladium leucocladulum, Muell.

As already noted in the BULLETIN, xviii. 55, this species, but once before found in fruit, has again been collected fertile.

In April, 1890, we first observed it, depending in long, wide festoons, sterile, from shelving granite ledges along the shores of Lake Pend d'Oreille, Idaho ; a month later, up a cañon, we found it again, abundantly fertile, growing very luxuriantly in large, compact masses, on ledges of dolomite as well as on the trunks and branches of *Taxus brevifolia* and *Thuya gigantea*. Last spring we met it again, fertile, on ledges of porphyritic-granite.

As is the case with most of the mosses here, it fruits at any season of the year, all depending upon the rainfall, but most abundantly during the winter when covered by four to six feet of snow.

The species varies greatly in its mode of branching, leaves, capsule, length of pedicel and size of plants. Typically, the primary stem is long, creeping, very slender, brown, of a horny consistency and sparsely beset with very small squamiform leaves. From it arises long, slender flagelliferous branches 8-15 cm. long, and shorter and more robust ones 4-6 cm. in length. The flagelliferous branches are mostly irregularly branching, sometimes quite simple and exceedingly attenuated. The leaves on them are very closely appressed and at frequent intervals tufts of long radicles are produced. They usually bear numerous female buds, the archegonia of which seldom develop into spore-bearing capsules.

The other variety of branches arising from the primary stem is coarse, stout, sub-pinnately branching with large leaves more or less spreading. They are not commonly produced into flagella, and are densely beset with female non-radiculose buds. By reason of the squarrose tips of the perichætial leaves, these buds are quite conspicuous, resembling little burs.

The Manual says as to inflorescence, " flowers monœcious ;" " pseudo-monoicus," would be more correct. We find male buds sparingly on the stems that bear archegonial inflorescence, but the antheridia in these buds I have not yet found otherwise than abortive.

The perfect male buds are developed on separate stems, (plants) ? are found in the axils of the leaves and as terminations of short lateral branches. This latter condition is only apparent, not real, for careful dissection shows that the stem is always slightly prolonged beyond the bud, thus maintaining its lateral position. Very few of these short bud-bearing branches develop beyond the point where the first bud is formed, except as noted above ; usually several buds are produced at this place, or a rosette of leaves, or the branch dies. The buds contain two to three oblong antheridia $\frac{170}{70}=\frac{190}{90}$ mic., with few paraphyses.

The capsule varies from oval to cylindrical, erect, cernous or sometimes pendent, constricted under the orifice or not, broad-mouthed or with a very small orifice. Manual says "teeth latticed ;" this is only the case when the operculum is first lifted. The trabecula are seen joined, very delicately, soon, however, breaking apart. The leaves on the fertile stems are mostly ovate, narrowed into a long or short accumination ; on the flagella the leaves assume a more elongated outline and the point becomes longer.

I have not seen the types from which the characters of *Tripterocladium leucocladulum* were drawn but, fide E. G. Britton, they compare with my No. 241 of Idaho mosses, the species referred to above. Upon comparison with No. 469 of Macoun's Canadian mosses, *Platygyrium rupestre*, Kind., later *Tripterocladium rupestris*, it is impossible to avoid the conclusion that Macoun's No. 469 merely represents the flagelliferous state of the plant, with more elongated and longer acuminate leaves than the fertile plant characterized in the Manual.

JOHN B. LEIBERG.

Ballast-Plants at South Bethlehem, Penn.

Near the iron furnaces of that inland city are large heaps of ores brought over the seas as ship-ballast from Spain, Africa, and the West Indies, and transported thither by railroad from New York. On these heaps, as usual, foreign plants have appeared, a few of which were first observed some years ago by Messrs. C. N. Lochman and E. A. Rau, but during the past two seasons quite a number were collected by Mr. Robert G. Bechdolt, who placed them in my hands for determination, and a list is given below. It is worthy of note that they all, except two—*Chrysanthellum procumbens*, Rich. and *Euphorbia Terracina*, L.—have already been reported as occurring on the ballast-grounds at New York, Camden, and Philadelphia.

Brassica Sinapistrum, Boiss.
Sisymbrium orientale, L.
Erysimum repandum, L.
Saponaria Vaccaria, L.
Polycarpon tetraphyllum, L. f.
Tribulus terrestris, L.
Cytisus scoparius, Link.
Melilotus Indica (L.) All.
Trifolim procumbens, L. var. *minus*, Koch.
Medicago lupulina, L.
Medicago denticulata, Willd.
Vicia sativa, L.
Vicia hirsuta, (L.) Koch.
Scorpiurus subvillosa, L.
Sherardia arvensis, L.
Calycera balsamitæfolia, Rich.